CLAIMS:

1. A method for recording data in an optical recording medium constituted so as to project a laser beam whose power is modulated in accordance with a pulse train pattern including at least a pulse whose level is set to a level corresponding to a level of a recording power and a pulse whose level is set to a level corresponding to a level of a bottom power onto a write-once type optical recording medium including a substrate and at least one recording layer formed on the substrate and form at least two recording marks in the at least one recording layer, thereby recording data, the method for recording data in an optical recording medium comprising a step of determining a pulse train pattern so that a level of a pulse is switched from a level corresponding to the level of the recording power to a level corresponding to the level of the bottom power in accordance with at least one of a length of a first recording mark, a length of a blank region to be formed immediately after formation of the first recording mark and a length of a second recording mark formed subsequent to the formation of the first recording mark, modulating a power of laser beam in accordance with the thus determined pulse train pattern, projecting the laser beam onto the at least one recording layer and forming the first recording mark.

2. A method for recording data in an optical recording medium in accordance with Claim 1, wherein a delay time period T3 between a fall time of a data pulse corresponding to the first recording mark and a time at which the level of a pulse is switched from the level corresponding to the level of the recording power to the level corresponding to the level of the bottom power in the pulse train pattern used for forming the first recording mark is set so as to satisfy a formula below, wherein T3 ($x1$, y,

z) is a delay time period T3 in the case of forming the first recording mark having length *x1*, the blank region having length *y* after the formation of the first recording mark and the second recording mark having length *z* and T3 (*x2, y, z)* is a delay time period T3 in the case of forming the first recording mark having length *x2*, the blank region having length *y* after the formation of the first recording mark and the second recording mark having length *z*, where *x1* is smaller than *x2*.

T3 (*x1, y, z)* > T3 (*x2, y, z)*

3. A method for recording data in an optical recording medium in accordance with Claim 1 or 2, wherein a delay time period T3 between a fall time of a data pulse corresponding to the first recording mark and a time at which the level of a pulse is switched from the level corresponding to the level of the recording power to the level corresponding to the level of the bottom power in the pulse train pattern used for forming the first recording mark is set so as to satisfy a formula below, wherein T3 (*x, y1, z)* is a delay time period T3 in the case of forming the blank region having length *y1* after the formation of the first recording mark having length *x* and the second recording mark having length *z* and T3 (*x, y2, z)* is a delay time period T3 in the case of forming the blank region having length *y2* after the formation of the first recording mark having length *x* and the second recording mark having length *z*, where *y1* is smaller than *y2*.

T3 (*x, y1, z)* > T3 (*x, y2, z)*

4. A method for recording data in an optical recording medium in accordance with any one of Claims 1 to 3, wherein a delay time period T3 between a fall time of a data pulse corresponding to the first recording

mark and a time at which the level of a pulse is switched from the level corresponding to the level of the recording power to the level corresponding to the level of the bottom power in the pulse train pattern used for forming the first recording mark is set so as to satisfy a formula below, wherein T3 (x, y, $z1$) is a delay time period T3 in the case of forming the blank region having length y after the formation of the first recording mark having length x and the second recording mark having lengthf $z2$ and T3 (x, y, $z2$) is a delay time period T3 in the case of forming the blank region having length y after the formation of the first recording mark having length x and the second recording mark having length $z2$, where $z1$ is smaller than $z2$.

$$T3(x, y, z1) > T3(x, y, z2)$$

5. A method for recording data in an optical recording medium in accordance with Claim 1, wherein in the case of forming the blank region having length y after the formation of the first recording mark having length x and the second recording mark having length z, a value T3'(x, y, z : VL) obtained by normalizing a delay time period T3 set for forming the first recording mark having length x and recording data at a linear recording velocity VL with a channel bit period and a value T3'(x, y, z : VH) obtained by normalizing a delay time period T3 set for forming the first recording mark having length x and recording data at a linear recording velocity VH higher than the linear recording velocity VL with the channel bit period are set so as to satisfy a following formula.

$$T3'(x, y, z : VL) < T3'(x, y, z : VH)$$

6. A method for recording data in an optical recording medium in accordance with Claim 1, wherein the time at which the level of the pulse

of the pulse train pattern used for forming the first recording mark is switched from a level corresponding to the level of the bottom power to a level corresponding to the level of the recording power is determined in accordance with at least one of the length of the first recording mark and a length of a blank region to be formed before the formation of the first recording mark.

7. A method for recording data in an optical recording medium in accordance with Claim 6, wherein a delay time period T1 between a rise time of a data pulse corresponding to the first recording mark and a time at which the level of a pulse is switched from the level corresponding to the level of the bottom power to the level corresponding to the level of the recording power in the pulse train pattern used for forming the first recording mark is set so as to satisfy a formula below, wherein T1 (*a1*, *b*) is a delay time period in the case of forming the first recording mark having length *b* after formation of a blank region having length *a1* and T1 (*a2*, *b*) is a delay time period in the case of forming the first recording mark having length *b* after formation of a blank region having length *a2* longer than *a1*.

$$T1\ (a1,\ b) > T1\ (a2,\ b)$$

8. A method for recording data in an optical recording medium in accordance with Claim 6, wherein a delay time period T1 between a rise time of a data pulse corresponding to the first recording mark and a time at which the level of a pulse is switched from the level corresponding to the level of the bottom power to the level corresponding to the level of the recording power in the pulse train pattern used for forming the first recording mark is set so as to satisfy a formula below, wherein T1 (*a*, *b1*)

is a delay time period in the case of forming a recording mark having length *b1* after formation of a blank region having length *a* and T1 (*a*, *b2*) is a delay time period in the case of forming a recording mark having length *b2* longer than *b1* after formation of a blank region having length *a*.

$$T1(a, b1) < T1(a, b2)$$

9. A method for recording data in an optical recording medium in accordance with any one of Claims 1 to 8, wherein the first recording mark is the shortest recording mark.

10. An apparatus for recording data in an optical recording medium constituted so as to project a laser beam onto a write-once type optical recording medium including a substrate and at least one recording layer formed on the substrate and form at least two recording marks in the at least one recording layer, thereby recording data and comprising a laser projecting means for projecting a laser beam whose power is modulated in accordance with a pulse train pattern including at least a pulse whose level is set to a level corresponding to a level of a recording power and pulse whose level is set to a level corresponding to a level of a bottom power onto the optical recording medium, the laser projecting means being adapted for projecting the laser beam whose power is modulated in accordance with a pulse train pattern determined so that a level of a pulse is switched from a level corresponding to the level of the recording power to a level corresponding to the level of the bottom power in accordance with at least one of a length of a first recording mark, a length of a blank region to be formed immediately after formation of the first recording mark and a length of a second recording mark formed

subsequent to the formation of the first recording mark onto the optical recording medium, thereby forming the first recording mark in the at least one recording layer.

11. An apparatus for recording data in an optical recording medium in accordance with Claim 10, wherein the laser projecting means is constituted so as to project the laser beam whose power is modulated in accordance with a pulse train pattern in which the time at which the level of the pulse of thereof is switched from a level corresponding to the level of the bottom power to a level corresponding to the level of the recording power is determined in accordance with at least one of the length of the first recording mark and a length of a blank region to be formed before the formation of the first recording mark and form the first recording mark.

12. An optical recording medium comprising a substrate and at least one recording layer and constituted so that at least two recording marks are formed and data are recorded in the at least one recording layer thereof when it is irradiated with a laser beam whose power is modulated in accordance with a pulse train pattern including at least a pulse whose level is set to a level corresponding to a level of a recording power and a pulse whose level is set to a level corresponding to a level of a bottom power, which optical recording medium is further constituted to be recorded with a program for setting recording conditions necessary for determining the pulse train pattern so that a level of a pulse is switched from a level corresponding to the level of the recording power to a level corresponding to the level of the bottom power in accordance with at least one of a length of a first recording mark, a length of a blank region

to be formed immediately after formation of the first recording mark and a length of a second recording mark formed subsequent to the formation of the first recording mark.

13. An optical recording medium in accordance with Claim 12, which is constituted to be recorded with a program for setting recording conditions necessary for determining the time at which the level of the pulse of the pulse train pattern used for forming the first recording mark is switched from a level corresponding to the level of the bottom power to a level corresponding to the level of the recording power in accordance with at least one of the length of the first recording mark and a length of a blank region to be formed before the formation of the first recording mark.